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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/577,141

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Kazunori Nishimura

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EXAMINER

SUMMONS, BARBARA

ART UNIT

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/577,141	<b>Applicant(s)</b> NISHIMURA ET AL.	
	<b>Examiner</b> BARBARA SUMMONS	<b>Art Unit</b> 2817	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 25 April 2006 (pre-amend.).
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 19-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 19-23 and 25-40 is/are rejected.
- 7) ☒ Claim(s) 24 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 April 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4/25/06</u> .   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Drawings***

1. Figures 20-22 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated (see e.g. the specification page 11, lines 17-22). See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

2. Claims 26, 28, 36 and 38 are objected to because of the following informalities:

In each of similar claims 26 and 36, to improve the clarity of where the "opposite side" is located, the Examiner suggests that on line 3 of the claims "opposite side" be followed by - - of the first inter-digital transducer - - since the series branch first inter-digital transducer is in the middle as shown in Applicants' Fig. 18.

Similarly, in each of claims 28 and 38, on line 3 thereof, the Examiner suggests that "opposite side" be followed by - - of the second inter-digital transducer - - since in this embodiment as shown in Applicants' Fig. 19, the parallel (i.e. to ground) branch second inter-digital transducer is in the middle.

Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 19-23, 30-34 and 40 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Bauer et al. WO03/081773 taken alone.

The Examiner will be referencing locations in the English language equivalent document U.S. 2005/0212620 (US '620) in the discussion that follows. Because the US application was a 371 of the PCT application/WO document, the specification thereof is necessarily a translation of the WO document.

Note that although Fig. 1 shows a ladder filter with two series resonator interdigital transducers (IDTs) acoustically coupled, Bauer discloses that series branch resonator IDTs may be acoustically coupled with parallel branch resonator IDTs (see e.g. US '620 section [0027], especially the last 3 lines thereof and sections [0012] and

[0015]) which would simply require switching the IS2 and IP resonator IDTs along with their terminals T2 and BP. Figs. 7, 8, 11 and 12 also show acoustic coupling between series IDTs and parallel IDTs, and Figs. 13-15 show how the inline acoustic coupling in one acoustic track is performed.

Therefore regarding claims 19-21, Bauer discloses a surface acoustic wave (SAW) filter comprising a piezoelectric substrate (see e.g. US '620 section [0070]), and at least two IDTs disposed in proximity to each other on the same SAW propagation path, the IDTs being IS1 and IP (remember IP has replaced IS2)(see also Figs. 13-15), on the piezoelectric substrate, wherein at least one of the IDTs IS1 is a first IDT serially connected to a signal path, and at least one IDT IP is a second IDT connected between the signal path and a reference potential (see US '620 section [0027], the last 3 lines and [0011]), wherein the first IDT IS1 and the second IDT IP are different in resonance frequency to obtain a preset filter response because the resonant frequency of the first series IDT IS1 is approximately equal to the anti-resonant frequency of the second parallel IDT IP (see US '620 section [0053]), and the first and second IDTs IS1 and IP have electrode fingers arranged almost continuously (see Figs. 13A, 14 and 15), wherein the electrode fingers in the first IDT IS1 and the second IDT IP in the area where the IDTs are adjacent, necessarily configure peaks and troughs of surface acoustic waves, and comb-shaped electrodes are connected in common on the side having the electrode fingers of the comb-shaped electrodes which configure the first IDT IS1 and the second IDT IP (see Figs. 14 and 15), and wherein the first IDT IS1 and the second IDT IP are also disclosed to have a reversed phase relationship (i.e. different by

180 degrees)[see US '620 sections [0032], [0037] and [0038], the last 3 lines thereof].

Regarding claim 22, reflectors RS1 and RS2 are disposed on the outermost sides of the IDTs IS1 and IP. Regarding claim 23, strip lines electrodes are disposed between the first and second IDTs (see Figs. 13C and 15) so that the electrode fingers of the IDTs and strip lines are arranged almost continuously.

Regarding independent claim 31 which differs from independent claim 19 in that instead of the IDTs being in reverse phase relationship, there is a pitch of plural electrode fingers arranged in a boundary area between the first and second IDTs that is different from a pitch of the electrode fingers in the respective center areas of the first and second IDTs which is disclosed at section [0062], wherein the U.S. equivalent of the incorporated WO document is U.S. 6,420,946 and the structure is described in that English language document at col. 3, lines 8-10 and 58-64. Regarding claims 32-34, the IDTs are disclosed to be weighted, wherein the weighting methods include apodization (a.k.a. overlap weighting) and withdrawal weighting (see US '620 section [0068]).

However, Bauer discloses connecting the parallel resonator IDT to reference potential and does not explicitly disclose connecting it to "ground" (claims 19 and 31), and Bauer does not explicitly disclose connecting multiple ones of the filters in cascade (claims 30 and 40).

The Examiner Takes Official Notice that it would have been extremely well known in the SAW ladder filter art that the parallel resonators be connected to a reference potential that is ground. That is, ground would have been merely an

extremely well known reference potential. The Examiner also Takes Official Notice that it would have been extremely well known in the SAW ladder filter art to cascade ladder filter unit sections that are L-shape or pi-shape or T-shape, to achieve the desired filter characteristics such as stopband suppression (see other art of record as evidence e.g. Plesski applied below).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the SAW filter of Bauer et al. Fig. 1, with IP in the position of IS2 as explicitly suggested by Bauer (see section [0027], the last three lines thereof and sections [0012] and [0015]), by having connected the second IDT IP to ground because ground would have been merely an extremely well known reference potential in the SAW ladder filter art, and to have cascaded multiple ones of the T-sections shown in Fig. 1 to form a multi-stage filter, because such an obvious modification would have been done routinely in the art to achieve the desired filter characteristics, e.g. if not achieved by a single stage filter as would have been well known by one of ordinary skill in the art.

5. Claims 25 and 35 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Bauer et al. WO 03/081773 in view of Inoue et al. U.S. 2003/0117240 (an English language equivalent of JP 2003-198317 cited by Applicants).

Bauer discloses the invention including weighted IDTs as discussed above, except for the use of dummy electrodes at the tip gap ends of the electrodes.

Inoue et al. discloses that it would have been well known in the SAW ladder filter art to provide dummy electrodes at the tip gap ends of the electrode fingers (see Figs.

18 and 19) in order to improve energy trapping of the surface wave (see section [0082]). It would have been extremely well known to use dummy electrode fingers in overlap weighted IDTs as well.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the SAW filter of Bauer by having provided dummy electrodes at the tip gap ends of the electrode fingers of the IDTs, as suggested by the exemplary teaching thereof by Inoue, because such an obvious modification would have provided the advantageous benefit of increasing the energy trapping of the surface waves and thereby increasing the efficiency of the resonators as explicitly suggested by Inoue (section [0082]) and as would have been known by one of ordinary skill in the art.

6. Claims 19-23 and 26-30 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Plesski et al. U.S. 5,682,126 in view of Bauer et al. WO 03/081773.

Regarding claims 19-22, Fig. 4 of Plesski et al. discloses a SAW filter comprising a piezoelectric substrate (not shown but see e.g. col. 6, lines 32-33), and two IDTs 202 and 204 disposed in proximity, wherein a first IDT 202 is connected serially to a signal path between terminals t1 and t2 (see e.g. Figs. 2C,D), and a second IDT 204 is connected between the signal path and ground terminal t3 (see col. 5, lines 45-49), wherein the first IDT 202 and second IDT have different resonance frequencies and different finger periods to form a preset filter characteristic, and the resonance frequency of the first IDT 202 is approximately equal to the anti-resonance frequency of



the second IDT 204 (see col. 5, line 60 to col. 6, line 1), and the first and second IDTs are formed so that electrode fingers of the comb-shaped electrodes thereof are arranged almost continuously (see col. 6, lines 225-29), wherein electrode fingers in the first and second IDTs near where the two IDTs are adjacent necessarily configure peaks and troughs of surface acoustic waves propagated there through, and comb-shaped electrodes are connected in common (at bus bar 208) on the side having electrode fingers of the comb-shaped electrodes which configure the first and second IDTs, and wherein reflector electrodes 210 are disposed at the outermost sides of the IDTs.

Regarding claim 23, Fig. 5 shows an embodiment with strip line electrodes 210 disposed between the first and second IDTs 202,204. Regarding claims 26-29, Fig. 3A shows an embodiment with the first series resonator IDT in the middle and the second parallel resonator IDT and a third parallel resonator IDT connected to ground on the other side thereof with the third IDT 204 also having a period  $p_2$  and thus resonance frequency different from that of the first IDT 202 similar to Applicants' Fig. 18, and Plesski Fig. 3B shows a first series IDT 202 and a second parallel IDT 204 in the center with a fourth IDT being another series path IDT 202 on the other side thereof, similar to Applicants' Fig. 19, with the fourth series IDT 202 having a different finger period  $p_1$  and resonance frequency that the second IDT 204. Regarding claim 30, Figs. 8, 10A,B and 11A,B show connecting multiple ones of the L-shape ladder sections of Fig. 2 or the pi-shape section of Fig. 3A or T-shape section of Fig. 3B in cascade to achieve the desired filter characteristics (see col. 7, lines 25-30).

However, Plesski does not mention the relative phases of the first series IDT and the second parallel IDT being reversed with respect to each other.

Bauer discloses similarly acoustically coupled IDTs in SAW ladder filters as discussed above and discloses that it would have been known to adjust the phase of the coupling such that the phases between the two IDTs can be reversed (see section [0037], the last three lines thereof) either by the adjustment of the separation between the IDTs and the number of reflector/strip electrodes in the separation space (ibid. as pertaining to Plesski Fig. 5), or by just adjusting the separation space between the IDTs (see section [0039], lines 1-3).

Consequently, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the SAW filters of Plesski et al. (see e.g. Figs. 3A-5), by having provided that the series IDT 202 and the parallel IDT 204 would have been disposed in a reversed phase relationship, as suggested by the exemplary teaching thereof by Bauer (see sections [0032], [0037], [0038], the last three lines thereof to [0039], the first three lines thereof), because such an obvious modification would have provided the advantageous benefit of being able to adjust the characteristics of the entire filter component as suggested by Bauer (see section [0037], lines 10-13 thereof).

7. Claims 31 and 36-40 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Plesski et al. U.S. 5,682,126 in view of Bauer et al. U.S. 6,420,946.

Even though section [0062] of the first Bauer WO reference applied above incorporates the subject matter of the second Bauer reference US '946 (equivalent of

the incorporated WO document), the Examiner is alternatively just using the US reference here in order to simply make a less obtuse rejection.

Regarding claims 36-40 Plesski et al. discloses the invention as discussed above in respect to the correspondingly worded claims 26-30.

As discussed above, the independent claim 31 differs from independent claim 19 in that rather than requiring reversed phase transducers, claim 31 requires a boundary area between the IDTs have plural electrode fingers with a different pitch from the pitch of the electrode fingers in the center areas of the IDTs, and such a structure is not disclosed by Plesski.

Bauer US '946 discloses that between two IDTs with different pitches (see US '946 col. 2, lines 66-67 and col. 3, lines 8-10) such as those of Plesski, it would have been known to provide plural electrode fingers in the range of 5-8 fingers (col. 3, lines 8-10) in the junction area between the IDTs with a pitch smaller than the pitch of the electrode fingers in the center of the IDTs (col. 3, lines 58-64) in order to provide reduced losses at the junctions between the structures (ibid.) and hence improved insertion loss (see col. 3, lines 43-45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the SAW filter of Plesski (Figs. 3A-5) by having provided plural electrode fingers at the boundary between the first IDT 202 and the second IDT 204 with a different (i.e. smaller) electrode pitch than the remaining fingers at the centers of the IDTs, as suggested by the exemplary teaching thereof by Bauer US '946 (see col. 3, lines 8-10 and 58-64), because such an obvious modification

would have provided the advantageous benefits of reduced losses at the junction of the IDTs and hence improved insertion loss of the filter as a whole, as suggested by Bauer (col. 3, lines 43-45 and 58-64) and as would have been known by one of ordinary skill.

***Allowable Subject Matter***

8. Claim 24 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Bauer et al. U.S. 2005/0212620 is provided as an English language translation of the WO document (Bauer et al. WO 03/081773) applied above.

Bauer et al. U.S. 7,304,553 is the U.S. Patent that issued from the above U.S. published application and shows that the U.S. application SN 10/508,979 was a 371 of a PCT and is thus a translation of the PCT document.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BARBARA SUMMONS whose telephone number is (571)272-1771. The examiner can normally be reached on M-Th, M-Fr.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bob Pascal can be reached on (571) 271-1769. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

bs  
May 25, 2008

/Barbara Summons/  
Primary Examiner, Art Unit 2817